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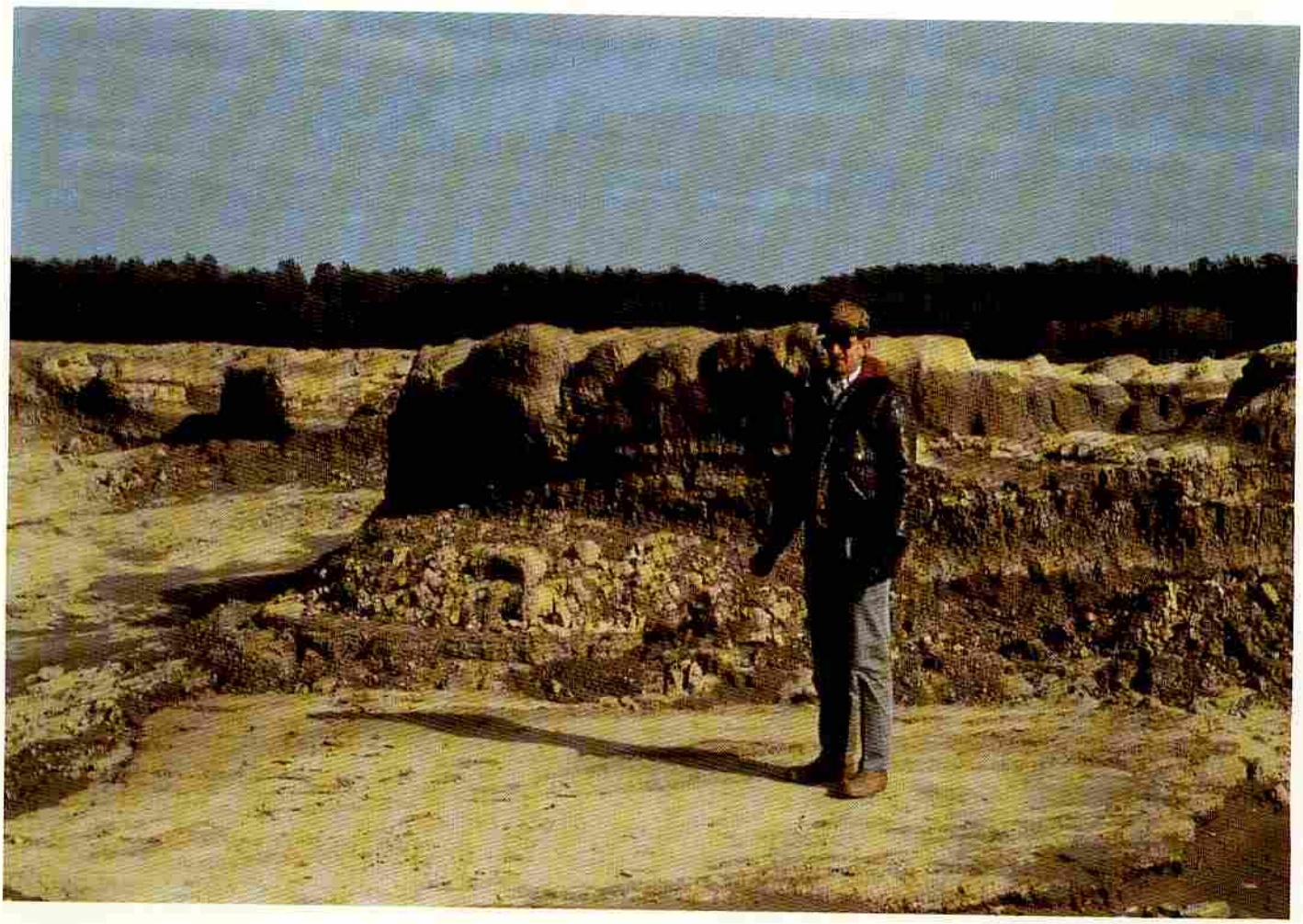
The Soil Conservation Service Responds to the 1993 Midwest Floods

Steven Phillips



Cover photo: Ross Braun, Emergency Operations Center Coordinator for Missouri's flood recovery effort, stands amidst badly scoured cropland in Howard County. Photo by Norm Klopfenstein, SCS-Missouri.

The Soil Conservation Service Responds to the

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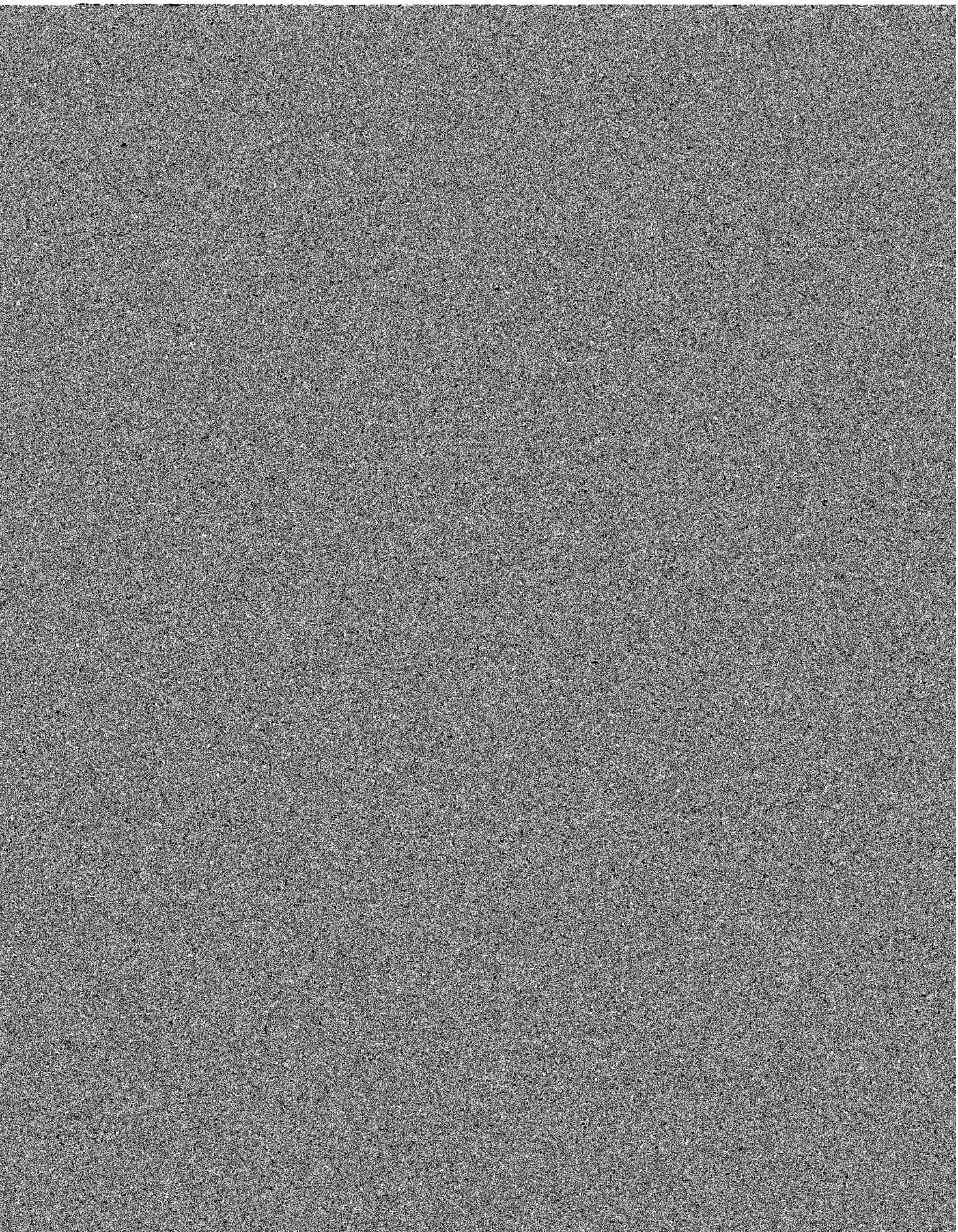
Foreword

This project began in August of 1994 with the support of National Historian Douglas

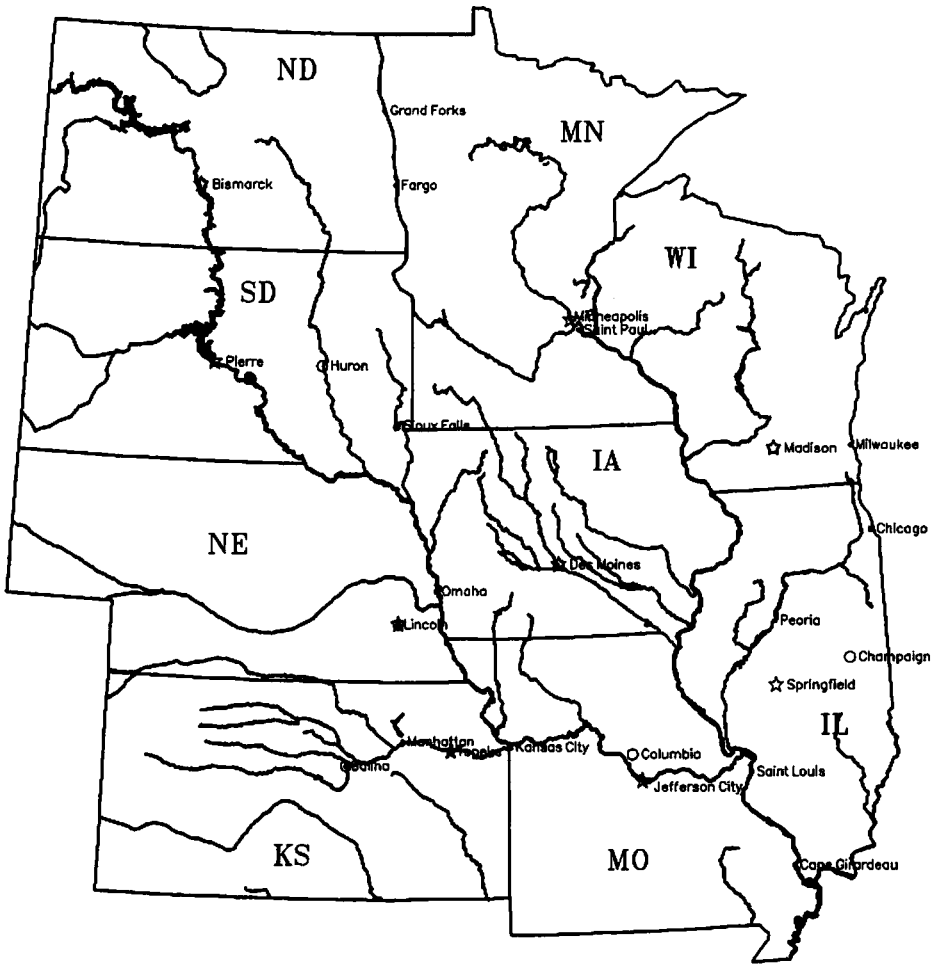
Introduction



Congress to flood recovery is examined. The activities of individual U. S. Department of Agriculture (USDA) agencies also receive attention. Most of this document focuses on the Soil Conservation Service's flood recovery program, new wetlands and levee policies, and the vexing problems encountered in this work. A fascinating part of this story is how SCS, an agency which had built very few levees, ended up repairing many of them. Finally, the Service's work in each of the nine flood states will be discussed in detail.

U. S. Department of Agriculture Soil Conservation Service

States Affected by the 1993 Flood



☆ State Capitol

○ SCS State Office

- Major City

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Map generated by the National GIS Applications Lab, Washington, D.C., August 1994

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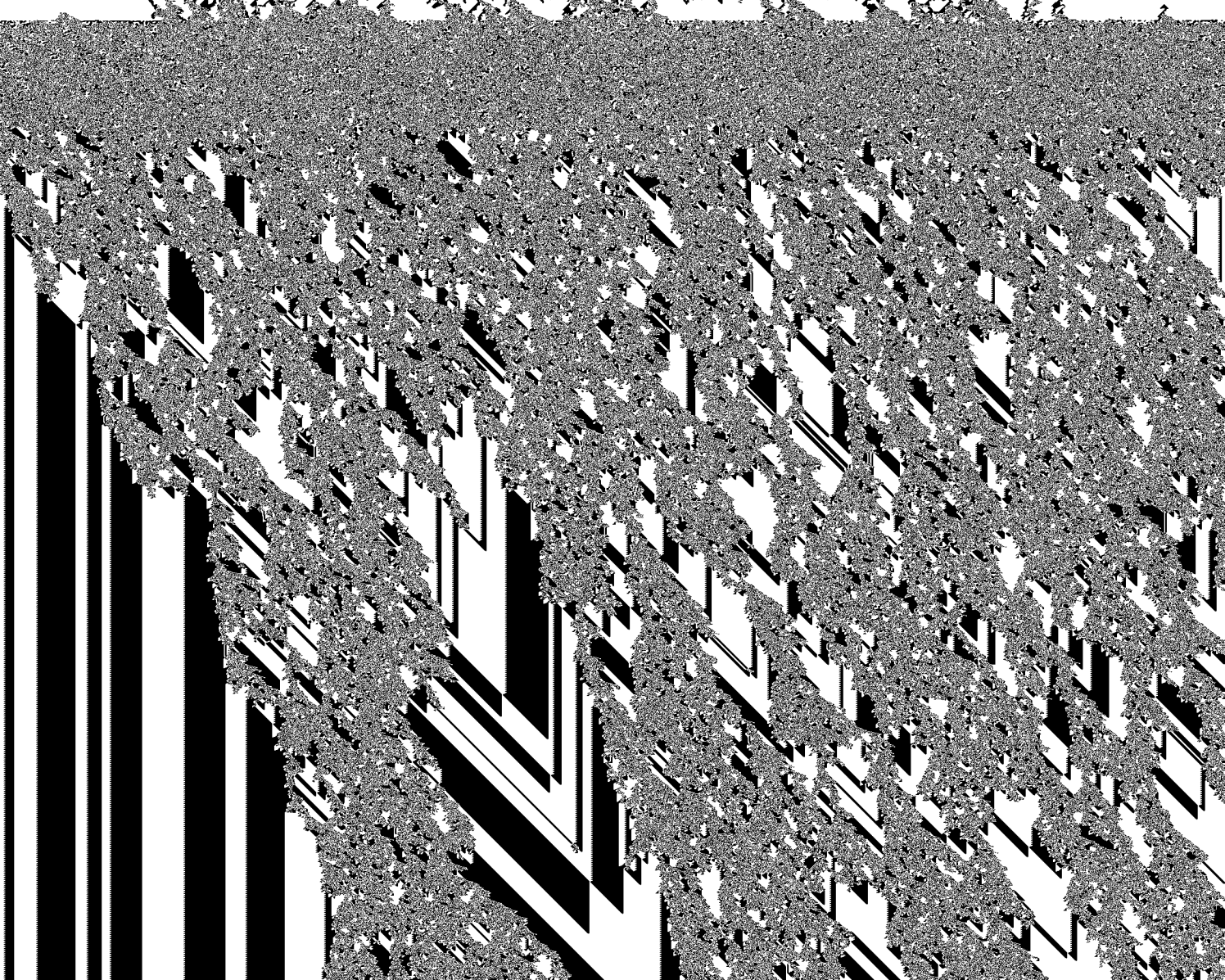
Historical Background

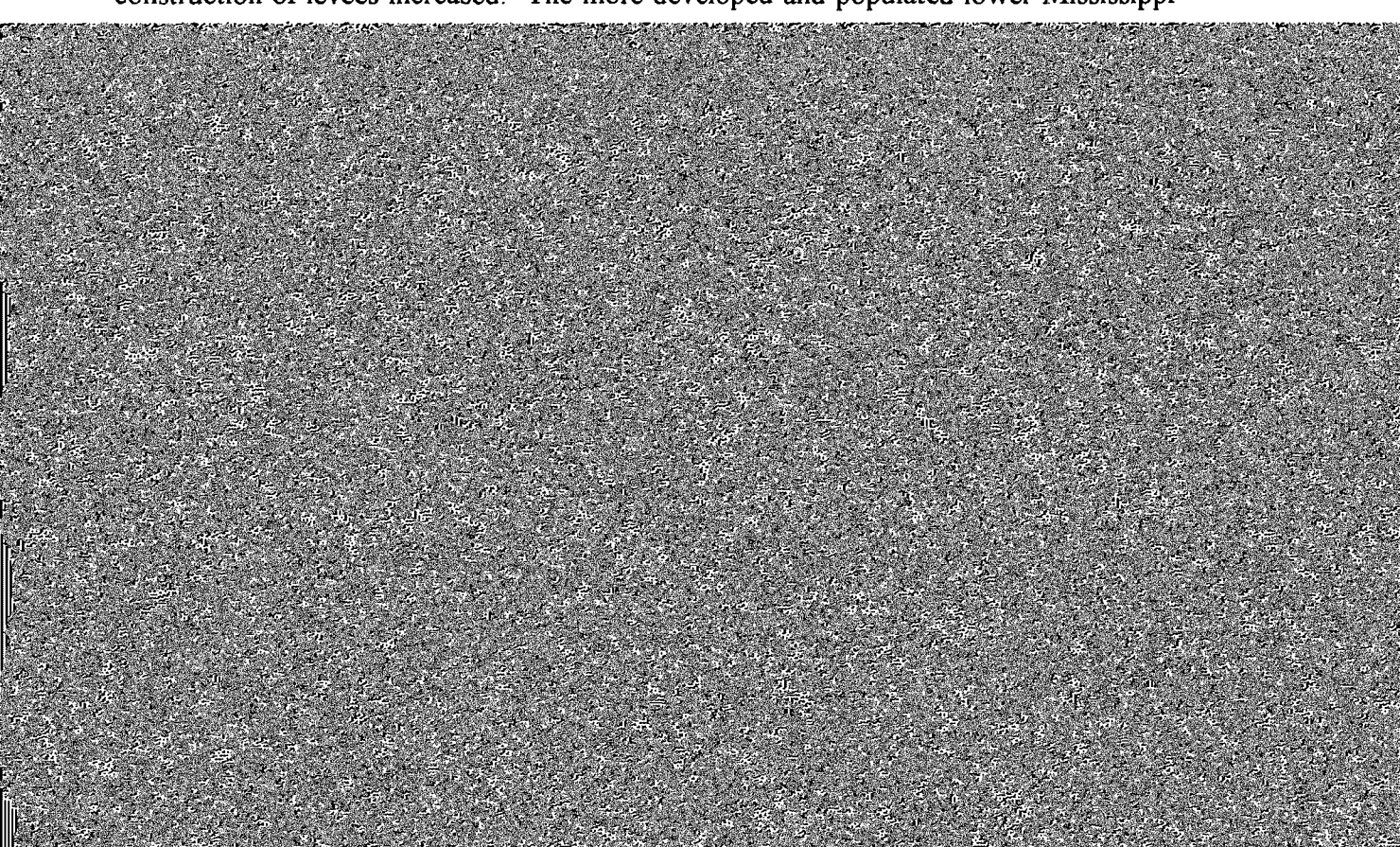
Human habitation, agriculture, and water control structures have existed in the Mississippi and Missouri regions for millennia. The archaeological record shows that Native Americans inhabited the lower Missouri River basin as early as ten thousand years ago.[3] Recent literature on the pre-Colombian period forms part of a great debate among experts over the impact of Native Americans upon the natural environment. Some scholars have attacked what they deem the "pristine myth" of Native Americans in perfect harmony with a natural environment unchanged by human activity.[4] One example of Native Americans modifying their natural environment was Cahokia, which was a city near today's East St. Louis. It supported 30,000 people. Huge projects in that area also included agricultural landforms, settlements, causeways, and ritual mounds. The largest remaining mound is 30.5 meters high and covers 6.9 hectares (about seventeen acres).[5] This is not to suggest that Native Americans built structures on the same scale or caused the same types or scope of environmental degradation as the European immigrants did, but rather to emphasize that the drive to control and use these



By the late 1600's, the French had moved into the Great Lakes region and had begun to explore the upper reaches of the Mississippi. By 1699, they realized that the river they had explored in the north emptied into the Gulf of Mexico. After Napoleon Bonaparte's victory over the Spanish, the French also took control of the land that would become New Orleans. Levee construction began in the early 1700's around this vital trading center near the mouth of the Mississippi River. By 1735 approximately forty-two miles had been completed below and above the city. In order to promote flood control, the French declared in 1743 that any land not protected by levees by the next year would be claimed by the Crown. From this humble beginning, flood control efforts generally spread northward, following the development of sizable towns and infrastructure in the major river bottoms.

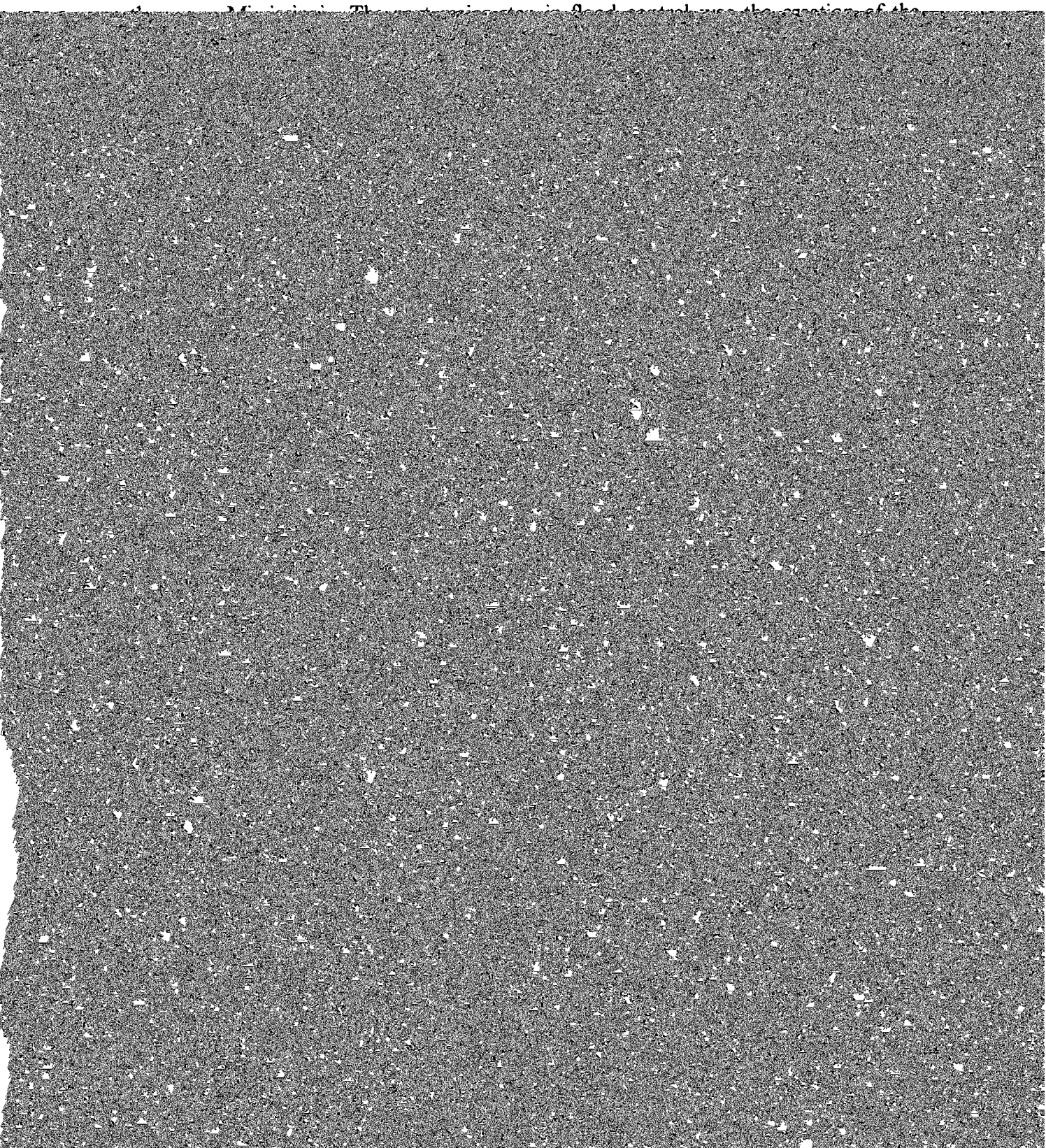
While these events set precedents in levee building and helped develop the lower Mississippi, President Thomas Jefferson's Louisiana Purchase of 1803 was the single most important step toward opening the Mississippi and Missouri regions to permanent, non-Native American, settlement. Migrants, mainly farmers, pressed westward by land. The marriage of agricultural commodities and inexpensive river transport quickly made this region vital for the young Republic's economic development. By the late 1800's, the upper Mississippi also had become an important waterway for lumber, grain, and other commodities.[7] The river has played a role not only in the nation's economic life, but also in its cultural development, as shown by the works of Samuel Clemens (Mark Twain).[8]

As settlements grew into towns, then into cities, concerns over flooding grew and the construction of levees increased. The more developed and populated lower Mississippi



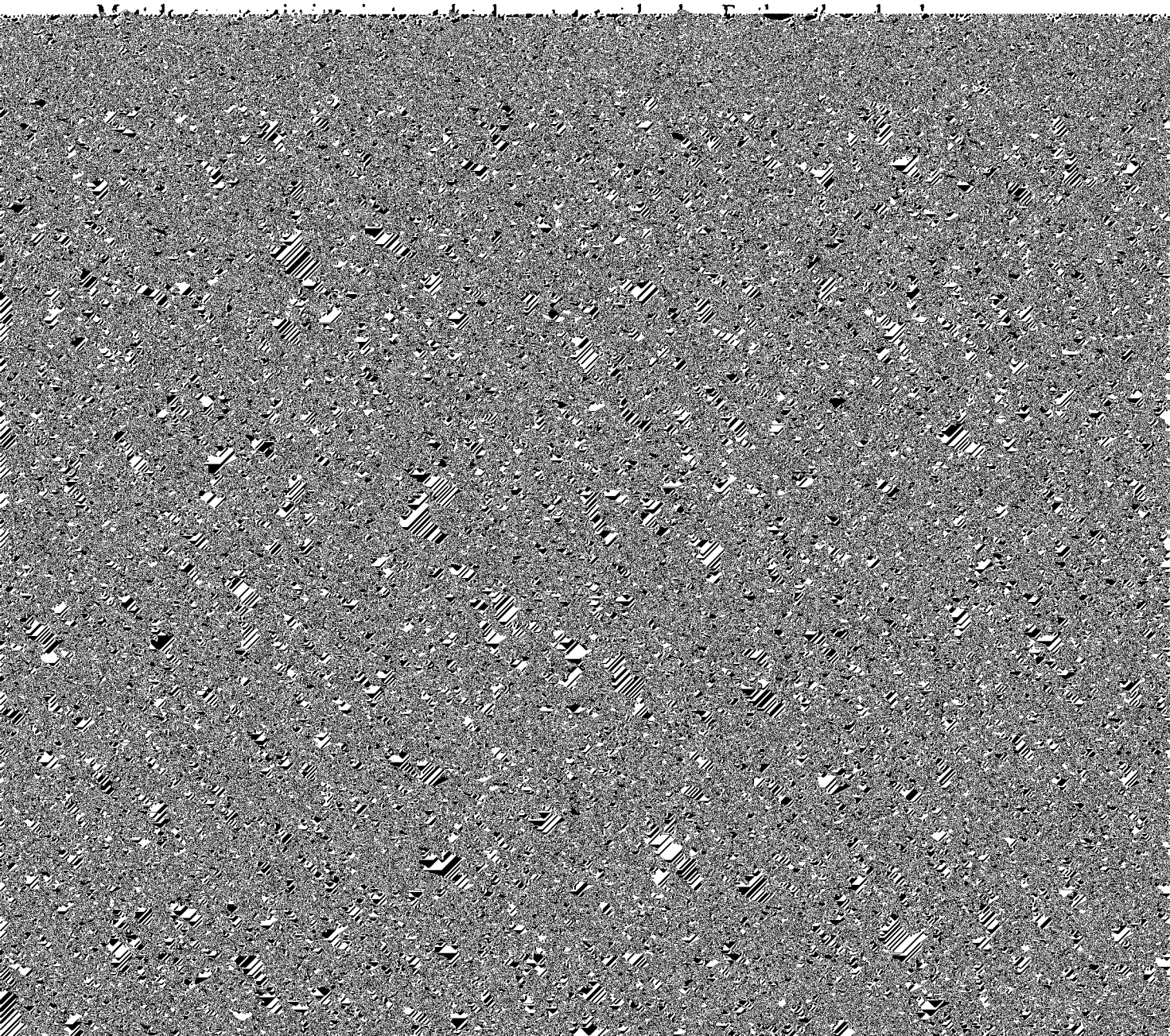
away from this singular focus on levees by the early 1900's. The legacy of this policy was the Corps' alleged over-emphasis upon flood control structures, of which levees were among the most visible. This became a key point of contention in the aftermath of the 1993 flood.

It was not until 1866 that Congress authorized funds for navigational improvements on



The focus of flood control work gradually shifted to the Ohio, Missouri, Arkansas-White-Red and upper Mississippi basins in the 1960's.[13] Much of the structural work centered on the construction of dams and reservoirs on tributaries to the Mississippi, such as the Cedar River, Des Moines River, and the Grand River.[14] In 1962 Congress attempted to coordinate flood control efforts by authorizing what became only one of many commissions, committees, or interagency studies--the Upper Mississippi River Comprehensive Basin Study. This project, led by the Corps of Engineers in consultation with other federal agencies and individual states, was completed in 1972. Historically, the problem this and other groups have faced has not been developing rational, long-term solutions to floodplain management problems. Instead, change has been stymied by the lack of political support that could be translated into legislative and financial backing.

It is important to remember that, on the upper Mississippi, more than in the lower reaches, flood control did and does reflect a mixture of local, state, and federal efforts.



lasting from early April through mid-May, was greater than in 1951. Another event was the April flood of 1969, which devastated South Dakota, Minnesota, Wisconsin, Illinois, and Iowa, caused $147 million in damages, and took eleven lives. In many areas, the recurrence levels exceeded that of a fifty-year flood. This disaster was the result of heavy rains in the fall of 1968 and blizzards in early 1969. In fact, March and April rainfall in the region was below normal; this event was almost solely the result of previous precipitation. The 1973 flood was caused by rain, not snowmelt. Rainfall over much of the Midwest was two hundred and twenty percent above normal for the first six months of 1973. Hannibal, Missouri, was at flood stage for one hundred days in the spring and early summer. About one hundred and eighty thousand acres were inundated.[17] These were the floods for which the people of the upper Mississippi and its tributaries had prepared. Each of these events was smaller than the 1993 flood.

Lower Missouri River

European or American exploration, settlement, and control of the Missouri River occurred slightly later than on the Mississippi. In 1673, French explorers Father Jacques Marquette and Louis Joliet traveled down the Mississippi to its confluence with the Missouri. They later wrote:

> As we were gently sailing down the still clear water (of the Mississippi River), we heard a noise of the rapid into which we were about to fall. I have seen nothing more frightful, a mass of large trees entire with branches...We could not without great danger expose ourselves to pass across...The water was all muddy, and could not get clear.[18]

This description raised an important distinction between the Mississippi and Missouri rivers. The latter flows through loessial soils of the central United States, constantly eroding and carrying these soils into the lower Mississippi. The Missouri River is nicknamed the "Big Muddy" due to its chocolate brown color--it carries up to five times as much sediment as the Mississippi River north of Cairo, Illinois.

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[17] Tweet, *A History of the Rock Island District,* chapter IX, "Flood Control."

[18] Quoted in Frances Cushman and Gordon MacGregor, *Harnessing the Big Muddy: The Story of the Missouri River Basin* (The United States Indian Service, 1948), 33.

The first non-Native Americans to see the source of the Missouri were members of the

Rufus Terral, in his history of the Missouri Valley, describes two types of "normal" flooding on this river.[25] First are the brief floods due to the rapid melting of snow on the Great Plains in March and April. Second is the "June rise" when snow in the mountains melts and heavy rains hit the lower basin. The worst floods appear when these two crests occur simultaneously. No previous floods caused the destruction nature wrought in 1993. One of the longest floods was in 1915. It lasted two and a half months. One of the most extensive floods was in 1943. It covered 2.26 million acres of Missouri River bottom lands, which was less than the area flooded in the state of Missouri alone in 1993.

One major flood was the 1951 event in Kansas and Missouri. As in 1993, heavy rains over an extended period of time were the chief cause. Greater than average precipitation fell in May, June and early July. Then on July 10, the heaviest rainfall since 1844 hit, dumping up to fifteen inches of rain in two days. Fifteen people died and property damage was estimated to be over one billion dollars. The actual time during which towns or farms were inundated, however, was only a few days. Foreshadowing 1993, the problems of scouring (topsoil being removed by rushing water) and sand deposits were prevalent along the Missouri River. Also, a USDA publication admitted that its work in straightening and improving channels sped up the water and increased flood crests.[26] This became an extremely contentious environmental issue in the 1960's and after.

Another large flood resulted from rains around Kansas City on September 12 and 13, 1977. The same weather pattern which produced between ten and sixteen inches of rain over two days in 1977 would reappear and remain over the Midwest for months in 1993. While a low pressure system was centered over Kansas, warm, moist air from the Gulf of Mexico pushed northward. The resulting precipitation led to stream flows greater than those estimated for a one hundred-year flood.[27] In 1977, the disaster affected only ten counties around Kansas City, yet twenty-five people died and the area suffered over $80 million in damages.

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[25] Rufus Terral, *The Missouri Valley: Land of Drought, Flood, and Promise* (New Haven: Yale University Press, 1947), 84.

[26] *The Great Flood*, Agriculture Information Bulletin No. 81 (Washington: U.S. Government Printing Office, 1952).

[27] For further details on this flood, see Leland D. Hauth and William J. Carswell, Jr, and Edwin H. Chin, *Floods in Kansas City, Missouri and Kansas, September 12-13, 1977*, U.S. Geological Survey and National Oceanic and Atmospheric Administration, Geological Survey Professional Paper P1169 (Washington: U.S. Government Printing Office, 1981).

The deluge of 1993 and SCS's response must be considered in the context of these previous floods and the resulting flood control efforts. Over the past one hundred years, a variety of federal, state, local, and private entities have built flood control structures on the upper Mississippi, the lower Missouri, and their tributaries. Usually, modifications to America's flood control policies were direct and immediate responses to major floods. While experts, advocates, and visionaries have called consistently for new approaches, the vital political and economic backing for change came only after large disasters. Unlike the lower Mississippi, Congress never authorized a single agency to enforce a unified system of floodplain management on the upper Mississippi and lower Missouri. Nevertheless, the region was prepared for the "regular" spring floods and had endured and recovered from less frequent, but much larger events. The debacle of 1993, however, was beyond anyone's expectations.

An Unprecedented Flood Event

There are a variety of ways to illustrate the incredible rainfall, flooding, and damages suffered in 1993:

- Three National Weather Service (NWS) weather stations in the Midwest reported receiving over four hundred percent of the normal July rainfall.

- NWS stated that, in eight of the nine flood states, July of 1993 was among the three wettest months since complete records were first kept in 1895.[28]

- This was the wettest June and July in history for Wisconsin, Iowa, and Illinois. Parts of Kansas and Missouri received 3.5 feet of rain between April and the end of July.[29]

- At the four USGS stream flow gauging stations with the longest complete records, peak discharge exceeded that expected with a one hundred-year recurrence interval. The peak discharge at Van Meter, Iowa, along the Raccoon River, was twice as great as any measurement taken in the gauging station's eighty-year history.[30]

- Over the course of the flood, fourteen rivers, including the Mississippi, Missouri, Illinois, Iowa, Minnesota, Des Moines, Rock, Raccoon, and Skunk, reached historic highs.

- SCS estimated that 12.8 million acres were flooded.

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[28] Much of this weather data comes from Kenneth L. Wahl, et. al., *Precipitation in the Upper Mississippi River Basin, January 1 through July 31, 1993*, U.S. Geological Survey Circular 1120-B (Washington: U.S. Government Printing Office, 1993).

[29] One inch of rain over one acre equals 27,143 gallons of water.

[30] Charles Parrett, et. al., *Flood Discharges in the Upper Mississippi River Basin*, 1993, U.S. Geological Survey Circular 1120-A (Washington: U.S. Government Printing Office, 1993), 8. Perhaps the best explanation of a one hundred-year flood comes from a 1992 floodplain management report:

> Probably the most misunderstood floodplain management term is the "100-year flood."...[T]he "100-year flood" is simply another term to refer to the one percent annual chance flood--the flood that has a one percent chance of being equaled or exceeded each year....Unfortunately, the term is often taken literally, with individuals believing that if they have experienced a "100-year" flood, another flood of that magnitude will not occur for another 100 years.

A one hundred-year flood is often called a "base flood." It becomes the standard which structures and flood control measures are built to contain. See chapter 9, "Perception, Awareness and Response," in *Floodplain Management in the United States: An Assessment Report, Volume 2: Full Report* (Federal Interagency Floodplain Management Task Force, 1992), 9-7.

Virgil Eichelberger inspects a center-pivot irrigation system on his farm in Muscatine County, Iowa. Photo by Ken Hammond, USDA.

- Due to rainfall and subsequent flooding, USDA's Economic Research Service lowered its 1993-4 national corn production estimate by eight percent (650 million bushels) and soybean estimate by three percent (seventy million bushels) in July.[31] These figures proved optimistic. Based on November estimates, the Midwest flood and Southeast drought were blamed for a thirty-one percent drop in corn production and a sixteen percent drop in soybean production compared to 1992. Corn yields declined from 131.4 bushels per acre in 1992 to 103.1 bushels in 1993.

- The Midwest suffered $12 billion in flood damages and forty-seven deaths.[32]

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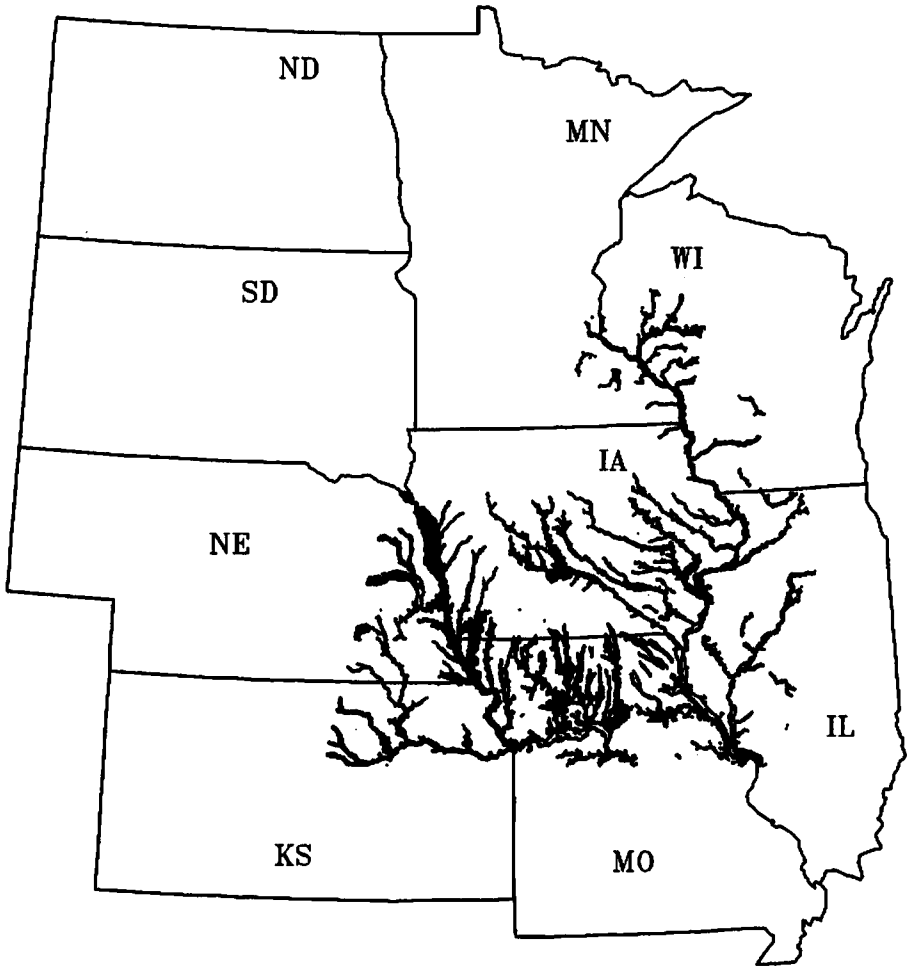
Area Inundated



Source: Earth Resource Observation System Data Center

Scale 1:20,000,000

Map generated by the National GIS Applications Lab,
Washington, D.C., August 1994

Map ID: SAW 949

With the benefit of hindsight, the disaster of 1993 does not appear to have been a complete surprise. For example, on March 6, 1993, a report buried on page 6B of the Minneapolis *Star-Tribune* contained a warning by a NWS hydrologist that the potential for minor to moderate flooding existed in the region.[33] In the late summer of 1993, the United States Geological Survey (USGS) reported that "The areal extent and magnitude of the 1993 Mississippi River flood was due to a persistent wet-weather pattern that was throughout the upper Mid-western United States for at least six months preceding the flood."[34] The pattern was due to the position of the jetstream, which steadily drew warm moist air from the Gulf of Mexico northward, where it clashed with cooler air from Canada, thus resulting in heavy rainfall. While the upper Midwest sat under this convergence zone and was drenched, the East from Alabama to Vermont suffered from

that there was insufficient data to blame Mt. Pinatubo or greenhouse gases.[39] It did not address the other issues. In early 1994, NOAA stated that the ENSO (El Niño-Southern Oscillation) was a major culprit of the 1993 Midwest floods.[40] It spawned the weather pattern that dumped heavy rain week after week over the central United States.[41]

James A. Smith, in the newsletter of the National Research Council's Water Science and Technology Board, put the 1993 flood into the context of the convergence of several inter-related factors. First, global atmospheric conditions increased the number and severity of storms moving eastward across the central United States. Second, wet soil conditions in the spring of 1993 increased run-off into streams and rivers. Third, increased soil moisture actually may have affected weather patterns and led to more thunderstorms in the region. Thus, the heavy rainfall became almost self-perpetuating.[42]

Whatever the cause, persistent rain, punctuated by a series of extremely powerful storms, wracked the upper Mississippi and lower Missouri river regions through the late spring and summer of 1993. In early June, heavy rain hit Minnesota, Iowa, North Dakota, and

preventing people from reaching their jobs.[45] Flood conditions would continue to worsen through August.[46] In July and August, it was as though a sixth Great Lake, centered around northern Iowa, had sprung up in the Midwest.

It was not just the amount, but also the content of the water that brought danger to the people of the Midwest and their neighbors in the lower Mississippi and the Gulf of Mexico. The flood waters carried pesticides, fertilizers, and all manner of debris downstream. A USGS expert stated that "We thought that concentrations [of agricultural chemicals] would be diluted by the record-high flows, but this did not turn out to be the case."[47] In fact, the total atrazine (an herbicide) load carried into the Gulf of Mexico between April and August of 1993 was 235 percent greater than during the same period in 1992 and eighty percent over the 1991 figure. The total nitrate load was 112 percent higher than 1992, and thirty-seven percent greater than in 1991. USGS also warned that the increased flow of freshwater and nitrates into the Gulf could lead to increased phytoplankton growth.[48]

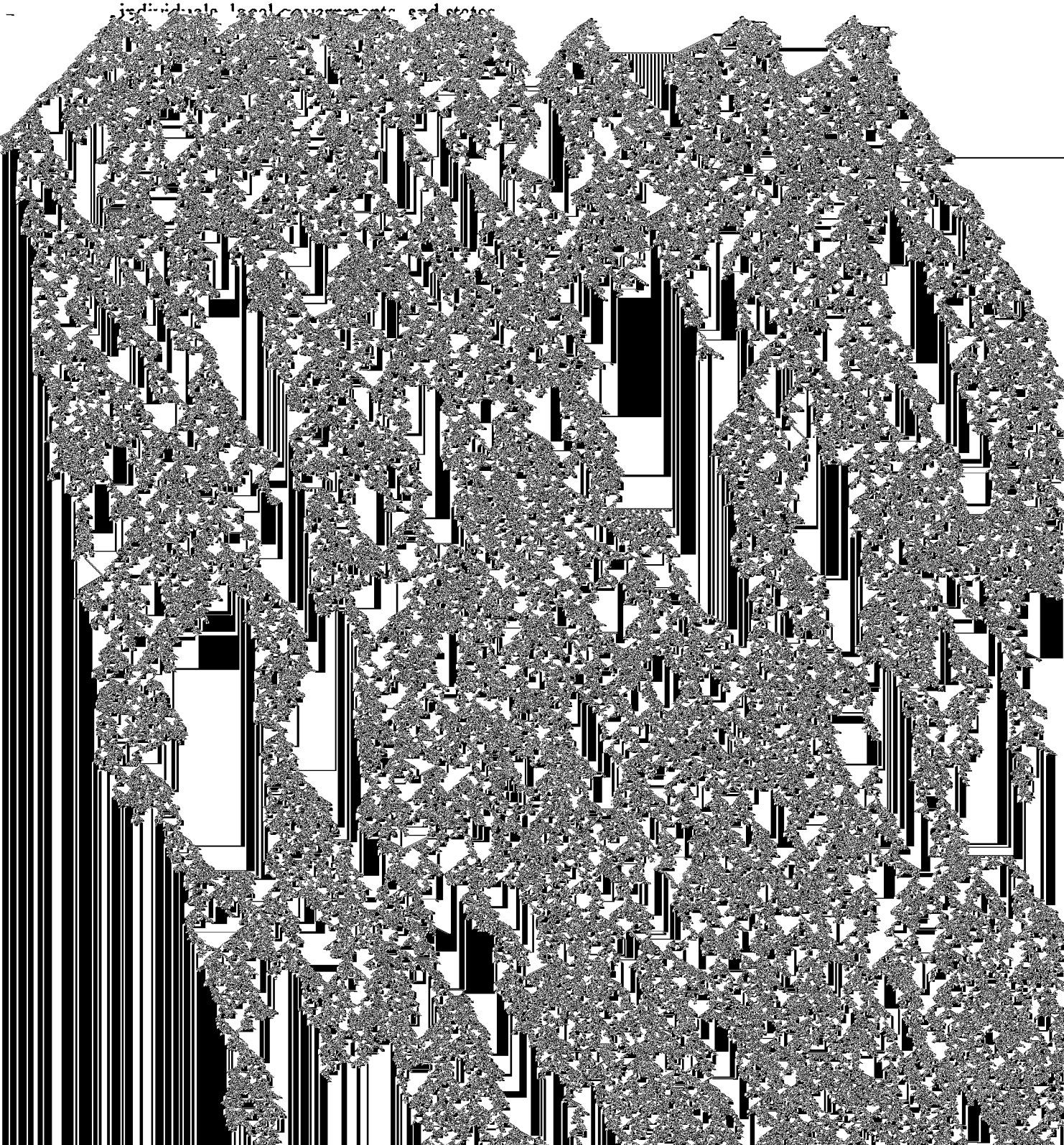
Fortunately, the period from October of 1993 through May of 1994 was slightly dryer than normal for much of the Midwest.[49] Although spring run-off in the region was normal or below normal in the spring of 1994, flooding returned in a few areas due to heavy localized rains falling upon ground still saturated from 1993.[50] On April 21, President Bill Clinton again declared parts of Missouri a disaster area "to help individuals and families in that state recover from severe storms, tornadoes, and flooding which began on April 9 and have continued to date."[51] Flooding also spread as far east as Ohio in mid-April. The Soil Conservation Service in Illinois reported significant flooding and

[45] Usually, the bridges were high enough to remain dry in the center. However, the highway approaches to the bridges were flooded.

[46] Although the story of the heroic flood fighting efforts and personal losses of Midwesterners is a fascinating one, it is beyond the scope of this study. For more information and photos of the flood and its [illegible]

damage to structures already weakened by the previous year's disaster. Up to eleven inches of rain fell in some areas, raising fears that 1994 would equal or surpass the devastation of 1993.[52] This eventuality did not come to pass, as the summer of 1994 proved to be relatively hot and dry.

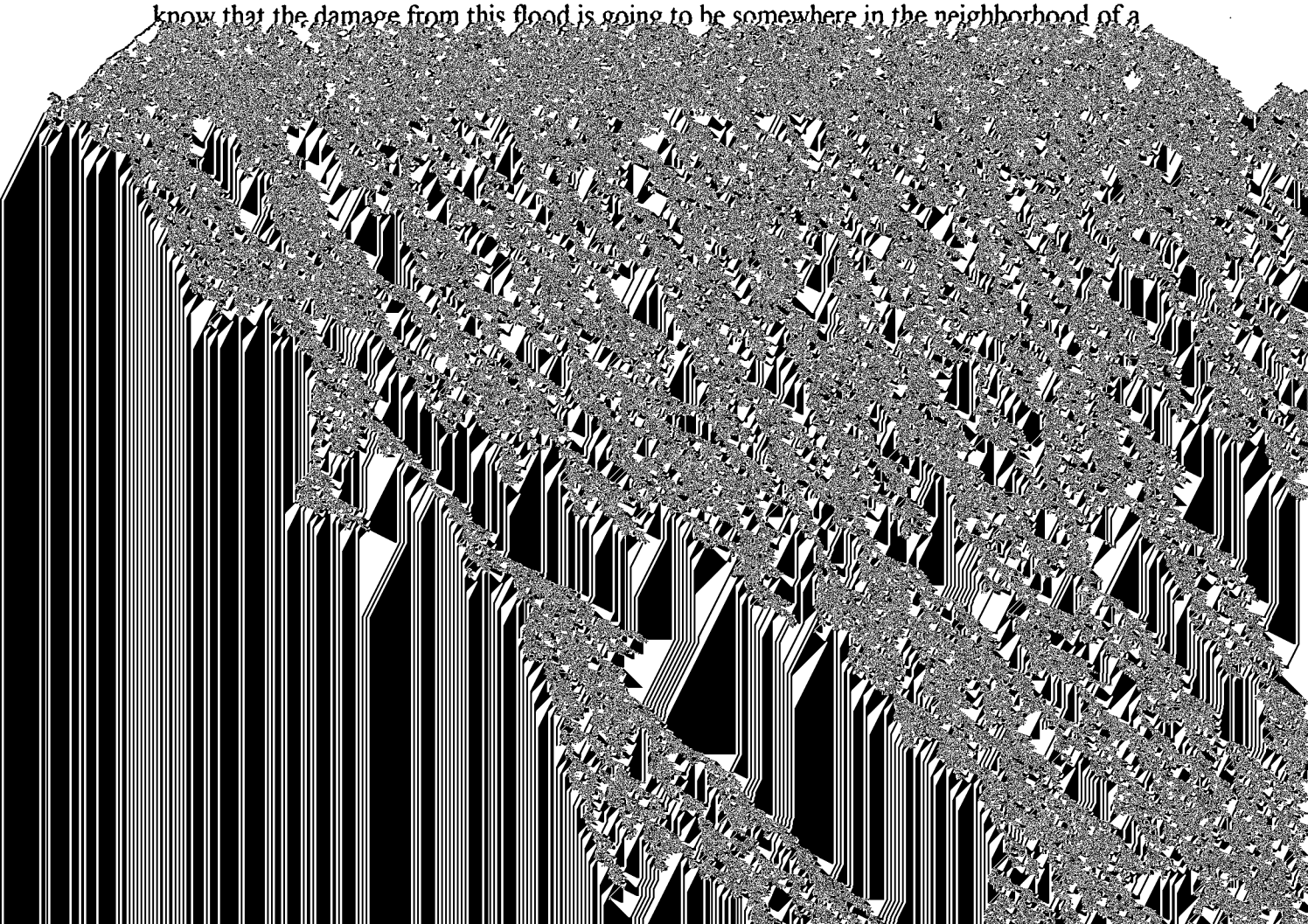
It was in the context of this severe and widespread flooding that the federal government, including the Soil Conservation Service, responded to requests for assistance from individuals, local governments, and states.



President Clinton, Congress and Flood Relief

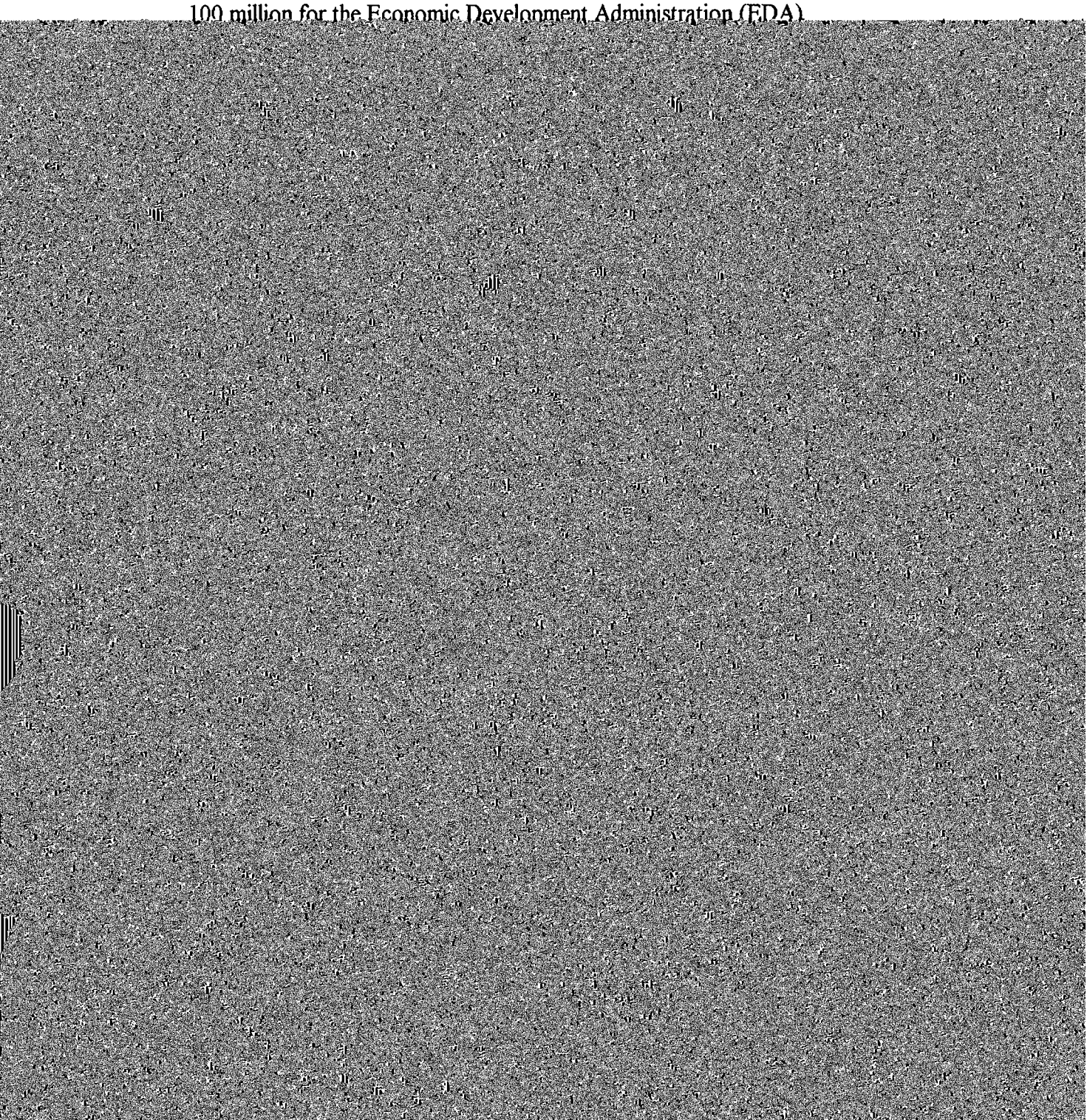
By the late spring of 1993, it had become clear that this disaster required resources greater than the individual states could marshal. In mid- and late June, state governors in the Midwest began to call for federal assistance. On June 28 Governor Terry Branstad of Iowa declared a disaster area in fifteen counties and called out the National Guard to assist with sandbagging operations.[53] The Governor of South Dakota requested that Secretary of Agriculture Mike Espy declare twenty-five counties in his state a disaster area. On July 1, the governors of Wisconsin, Minnesota, South Dakota, Iowa, and Illinois announced that they were seeking federal disaster aid.[54] By July 26, President William F. Clinton had declared that major disasters existed in nine states.[55]

The statements and actions of Congress and President Clinton concerning the Midwest flood paralleled the rest of America's: a restrained first reaction in June and early July followed by re-evaluation and a heightened response as the full magnitude of the disaster became apparent. Shortly before traveling to Iowa for a town meeting about the flood on July 8, President Clinton released $100 million from his disaster fund. He also announced his intention to sign a bill making available another $297 million and to request additional money from Congress. At that time the President stated that "we know that the damage from this flood is going to be somewhere in the neighborhood of a



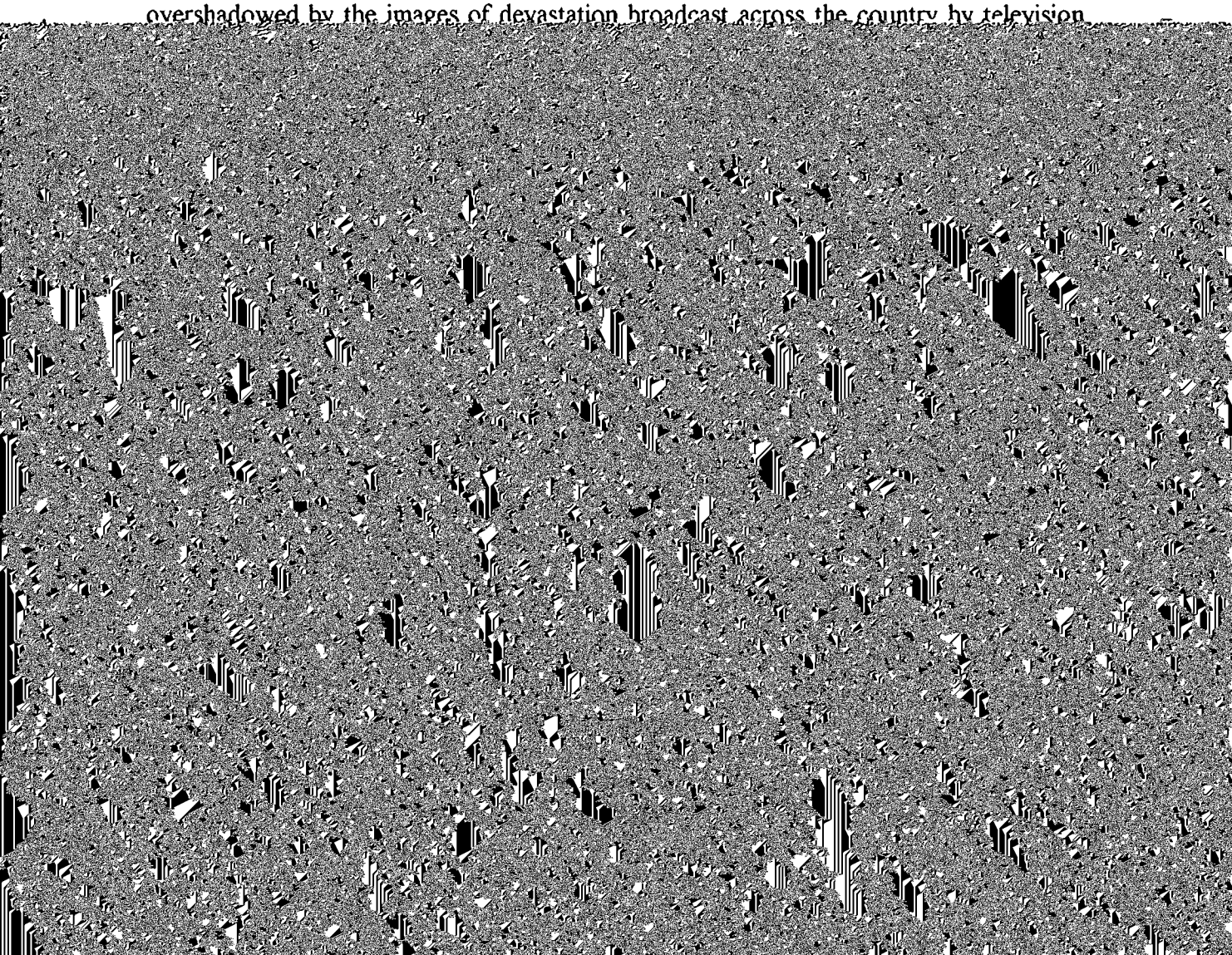
The President unveiled his initial $2.482 billion flood relief plan on July 14.[57] It included the following amounts:

$600 million for the Commodity Credit Corporation
($300 million extra upon Presidential request)
550 million for the Federal Emergency Management Administration
($250 million extra available)
153 million for the Department of Housing and Urban Development (HUD)
100 million for the Economic Development Administration (EDA)



the wettest season on record.[59] Governors, members of Congress, and local officials at the meeting stated that they did not consider these amounts adequate.[60] A request to raise this supplemental appropriation was made on July 29.[61]

As federal assistance offered to the Midwest increased, a variety of news reports examined the amount of aid sought by politicians, farmers and residents of the Midwest. One article pointed out that the federal government could actually save money, since the disaster relief payments to farmers (estimated at one billion dollars at that time) were more than offset by the expected reduction in agricultural subsidies.[62] Some questioned the amount of relief payments or the method of disbursing aid.[63] Other writers examined the claim that early damage estimates are often unreliable and exaggerated.[64] In mid-July, a *USA Today* article detailed flood losses in nine states. According to figures gathered from various state agencies, Missouri was among those suffering the worst with thirty to thirty-five percent of the state's cropland affected, crop damage of $700 million, and property damage of $2.7 billion. In Iowa, twenty-nine percent of the farmland was flooded, crop damage was approximately one billion dollars, and property damage was $1.7 billion.[65] The article stated, however, that the overall economic impact of the floods would be minor compared to Hurricane Andrew.[66] Such observations were overshadowed by the images of devastation broadcast across the country by television



objections of Republican congressmen were overridden and the bill continued to wend its way through Congress. Another potential roadblock was an amendment by a representative from Ohio to prohibit illegal aliens from receiving any benefits from the relief bill. Beyond humanitarian considerations, when the logistical difficulties of implementing this policy became clear, the amendment was dropped.

The Senate then considered a $4.3 billion aid plan. The increase from the previous figure stemmed from Clinton's commitment to the governors of nine flood states (Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin) to provide adequate assistance. The relief package was designed to reimburse farmers ninety percent for losses in excess of seventy-five percent of their crop and fifty percent for any other portion. The Emergency Conservation Program, watershed repair, and the Wetlands Reserve Program (WRP) received a total of $102 million. The Corps of Engineers received $235 million for flood control work.[68] The *Chicago Tribune* reported that $60 million would go to SCS for rebuilding flood control structures.[69] In fact, the $60 million was divided among flood control structures, wetlands, erosion control, streambank protection, and a host of other uses.

The amount had increased to $4.7 billion when the bill was approved by the Senate Appropriations Committee. Even as this occurred, President Clinton asked that $1.3 billion be added to that. The final version of the bill was passed on August 10. On August 12, the President signed H.R. 2667, "Emergency Supplemental Appropriations for Relief from the Major, Widespread Flooding in the Midwest Act of 1993." It authorized a total of $5.8 billion of Federal assistance.

[68] Robert Greene, "Clinton Raises Flood Aid Request to $4.3 Billion," AP wire, July 30, 1993.
[69] Constance Hunt, "Returning the Wetlands to the Water," *Chicago Tribune*, July 31, 1993.